Form PTO-1390	U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER P19790
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S. APPLICATION NO. (If known, see 37 CFR) Not yet assigned 09/646119
INTERNATIONAL APPLICATION NO. PCT/EP00/00491	INTERNATIONAL FILING DATE 21 January 2000	PRIORITY DATE CLAIMED 28 January 1999

TITLE OF INVENTION

MACHINE AND PROCESS FOR PRODUCING A MULTI-LAYERED FIBROUS WEB

APPLICANT(S) FOR DO/EO/US

Dr. Günter HALMSCHLAGER, Franz STELZHAMMER, Erich BRUNNAUER, Manfred GLOSER, Dr. Manfred FEICHTINGER, Thomas NAGLER, Johannes STIMPFL

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. X This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.

2. ___ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.

3. X This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).

4. ___ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. X A copy of the International Application as filed (35 U.S.C. 371(C)(2))
   a. X is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ___ has been transmitted by the International Bureau.
   c. ___ is not required, as the application was filed in the United States Receiving Office (RO/US).

6. X A Translation of the International Application into English (35 U.S.C. 371 (c)(2)).

7. X Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ___ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ___ have been transmitted by the International Bureau.
   c. ___ have not been made; however, the time limit for making such amendments has NOT expired.
   d. X have not been made and will not be made.

8. ___ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3))

9. X An oath or declaration of the inventor(s) (35 U.S.C. .371(c)(4)). (Unexecuted)

10. ___ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ___ An information Disclosure Statement under 37 CFR 1.97 and 1.98.

12. ___ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. X A FIRST preliminary amendment.
    ___ A SECOND or SUBSEQUENT preliminary amendment.

14. ___ A substitute specification.

15. ___ A change of power of attorney and/or address letter.

16. X Other items or information:
    Cover Letter under 35 USC 371 and 37 C.F.R. 1.494
    PCT/ISA/220 (in German).
    PCT/ISA/210 (in German
    PCT/IB/304
    PCT/IB/301.
    Claim of Priority

430 Rec'd PCT/PTO 27 SEP 2000

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/646119	PCT/EP00/00491	P19790

	CALCULATIONS	PTO USE ONLY
17. X The following fees are submitted:		
Basic National Fee (37 CFR 1.492(a)(1)-(5)):		
Search report has been prepared by the EPO or JPO ..... $ 840.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) ..... $ 670.00		
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO(37 CFR 1.445(a)(2)) ..... $ 690.00		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... $ 970.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... $ 96.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 840.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ___ 20 ___ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ 0.00	

Claims	Number Filed	Number Extra	RATE		
Total Claims	45 - 20 =	25	X $18.00	$ 450.00	
Independent Claims	2 - 3 =	0	X $78.00	$ 0.00	
Multiple dependent claim(s) (if applicable)			+ $260.00	$ 0.00	
TOTAL OF ABOVE CALCULATIONS =				$1,290 .00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity Statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28)				$ 0.00	
SUBTOTAL =				$1,290 .00	
Processing fee of $130.00 for furnishing the English translation later than ___ 20 ___ 30 months from the earliest claimed priority date (37 CFR 1.492(f)).			+	$ 0.00	
Extension of Time fee in the amount of $			+	$ 0.00	
TOTAL NATIONAL FEE =				$1,290.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property			+	$ 0.00	
TOTAL FEES ENCLOSED =				$1,290.00	
				Amount to be refunded	$
				Charged	$

a. X A check in the amount of $ 1,290.00 to cover the above fees is enclosed.

b. ___ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. X The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-0089. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Neil F. Greenblum
GREENBLUM & BERNSTEIN, P.L.C.
1941 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

SIGNATURE

Neil F. Greenblum
NAME

28,394
REGISTRATION NUMBER

P19790.P02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Dr. Günter HALMSCHLAGER et al.

Serial No : Not Yet Assigned

Filed : Concurrently Herewith

For : MACHINE AND PROCESS FOR PRODUCING A MULTI-LAYERED FIBROUS WEB

PRELIMINARY AMENDMENT

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Prior to the examination of the above-identified patent application, the Examiner is respectfully requested to amend the specification and claims as follows:

IN THE CLAIMS

Please amend the claims as follows:

In claim 8, line 1, please delete "or 7".

In claim 11, line 1, please delete "or 10".

In claim 12, line 1, please change "one of the preceding claims" to ---claim 1---.

In claim 13, line 1, please delete "or 2".

In claim 15, line 1, please delete "or 14"..

In claim 16, line 1, please change "one of the claims 13 through 15" to ---claim 13---.

In claim 17, line 1, please change "one of the claims 13 through 16" to ---claim 13---.

In claim 19, line 1, please delete "or 18".

In claim 21, line 1, please change "one of the preceding claims" to ---claim 1---.

In claim 23, line 1, please change "one of the preceding claims" to ---claim 1---.

In claim 24, line 1, please change "one of the preceding claims" to ---claim 1---.

In claim 25, line 1, please change "one of the preceding claims" to ---claim 1---.

In claim 35, line 1, please delete "or 34".

In claim 36, line 1, please change "one of the preceding claims" to ---claim 1---.

In claim 37, line 1, please delete "or 27".

In claim 39, line 1, please delete "or 38".

In claim 40, line 1, please change "one of claims 37 through 39" to ---claim 37---.

In claim 42, line 1, please delete "or 41".

In claim 43, line 1, please change "one of the preceding claims" to ---claim 1---.

In claim 45, line 1, please change "one of the preceding claims" to ---claim 1---.

REMARKS

The Examiner is respectfully requested to enter the foregoing amendment prior to examination and calculation of the filing fees in the above-identified patent application.

Should there be any questions, the Examiner is invited to contact the undersigned at the below listed number.

Respectfully submitted,
Dr. Günter HALMSCHLAGER et al

Neil F. Greenblum
Reg. No. 28,394

September 27, 2000
GREENBLUM & BERNSTEIN, P.L.C.
1941 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

P19790.S02

Machine and Process for Producing a Multi-layered Fibrous Web

The invention relates to a machine for producing a multi-layered fibrous web, in particular a paper or cardboard web, in which the layers created by each former are couched together, i.e., connected. It further concerns a process according to the preamble of claim 26.

A machine and a process of this type are disclosed, for example, in the publications DE 197 04 443 A1, DE 198 03 591 A1, DE 197 33 316 A1, DE 196 51 493 A1, and DE 44 02 273 A1.

Different types of formers are known. For instance, in a fourdrinier former, the dewatering occurs at the wire side. A concentration of fines at the upper side is achieved with power pulses. In a hybrid former, the main dewatering occurs at the wire side. In the zone of the upper wire, the dewatering occurs at the top which results in a reduction of the content of fines at the top. In a so-called roll blade gap former the dewatering occurs first at the top and then at the bottom, which results in a higher content of fines at the bottom.

In the paper machines known from DE 197 04 443 A1 and DE 44 02 273 A1, combinations of two or more gap formers are used.

Embodiments of gap formers for packaging can be found, for instance, in publications DE 198 03 591 A1 (Duo Former Base) and DE 196 51 493 A1 (Duo Former Top). In the wire section described in DE 196 51 493 A1 the fibrous layer formed by the gap former and a first fibrous layer, introduced by a continuous belt, are couched together at their upper wire sides that are low in fines. The flow direction of the headbox associated with the gap former is the same as the travel direction of the continuous belt introducing the first fibrous layer.

This has the disadvantage, however, that the fibrous layers couched together at their sides with a low content of fines have poor layer adhesion.

It is the object of the invention to create an improved process as well as an improved device of the above mentioned kind in which better layer adhesion is ensured in an economical and reliable fashion.

This object is obtained concerning the paper machine in that at least two layers, which are to be couched together and each have on one side a higher content of fines, are guided to the applicable couching zones in such a way that the sides having the higher content of fines come into contact with each other and in that at least one of the two layers was created by a gap former.

This embodiment results in a number of relevant advantages in practical operation, for instance, better layer adhesion, higher retention, a lower risk of so-called "sheet-sealing"effects, less residue during dewatering, less dusting, as well as a positive influence on the paper characteristics concerning porosity, roughness, penetration characteristics, and printability.

In a preferred practical embodiment according to the invention, at least one of the two layers is created by a gap former that contains two circulating continuous dewatering belts which converge forming a headbox nip and which, in the area of this headbox nip loaded by a headbox with a fibrous suspension, are guided by a forming element such as, in particular, a forming roll or the like. At least one of the two dewatering belts can be provided, in particular, as a dewatering wire.

In an advantageous practical embodiment according to the invention, each of the two layers is formed by a gap former. The sheet formation of the two layers each occurs with a higher content of fines at the forming element side. The web travel directions of the two gap formers are preferably opposite to each other. In this context, in particular,

such embodiments are conceivable in which the layer formed in the first gap former is converged with at least one of the two dewatering belts around a deflection element, such as, in particular, a deflection roll or the like, and then introduced into the corresponding couching zone via a continuous belt in a direction generally opposite to the flow direction of the first headbox, in which the layers created by the two gap formers are couched together at the sides with the higher content of fines.

Here, for instance, the layer created in the first gap former can be guided around the deflection element together with the outer dewatering belt, which does not come into contact with the forming element, and be introduced into the couching zone via this outer dewatering belt. Preferably, both dewatering belts are guided around the deflection element and, after having passed this deflection element, the inner dewatering belt is separated from the outer dewatering belt which entrains the layer. It is useful to guide the outer dewatering belt of the first gap former following the deflection element in a generally horizontal direction, at least up to the area of the couching zone.

However, another embodiment is conceivable, for instance, in which an additional layer is created by an endless wire former and the formation of the sheets of this layer occurs with a higher content of fines on the outer side facing away from the endless wire, while the layer created in the first gap former and guided over the deflection element is couched together with the layer created by the endless wire, and these two layers are introduced via the endless wire into the couching zone in which the layers formed in the two gap formers are couched together with their sides with higher contents of fines. In this connection it is advantageous for the outer dewatering belt of the first gap former in the web travel direction to be separated from the inner dewatering belt and the relevant layer before the deflection element, and for only the layer in question to be guided around the deflection element together with the inner dewatering belt. The layer created in the endless wire former and the layer created in the first gap former are preferably couched together in the area of the deflection element and/or of a couching roller.

After the separation of the two relating dewatering belts of the second gap former, the layer created by the second gap former can be introduced into the couching zone together with the outer dewatering belt in which the two layers created in the gap formers are couched together with their sides with a higher content of fines.

An alternative embodiment of the machine according to the invention is characterized in that one of the two layers couched together with their sides containing a higher content of fines is created by an endless wire former and the sheet formation of this first layer occurs with a higher content of fines on the outer side facing away from the endless wire and that the second layer is created by a gap former and the sheet formation of this second layer occurs with a higher content of fines on the forming element side.

In this connection, the flow direction of the headbox associated with the gap former advantageously corresponds generally to the travel direction of the first layer created by the endless wire former. The layer created by the gap former is preferably introduced after the separation of the two dewatering belts of the gap formers, together with the outer dewatering belt to the couching zone in which it converges for couching together the two layers with the endless wire. Preferably, the endless wire can be guided in a generally horizontal manner at least in the area of the couching zone.

At least one additional gap former is provided in a practical embodiment in which the sheet formation of the allocated additional layers with higher content of fines occurs at the forming element side. The additional layer is couched together with the layer created by the first gap former in an additional couching zone. The flow direction of the headbox associated with the additional gap former preferably corresponds to the travel direction of the layer created by the endless wire former.

In a practical manner, after a separation of the two dewatering belts of the additional gap former the additional layer created by the additional gap former is

introduced together with the outer dewatering belt of the additional couching zone in which it converges for couching together with the two layers formed by gap formers. Preferably, the endless wire is guided in generally horizontal fashion, at least in the area of the two couching zones.

For the formation of an at least three-layer to four-layer fibrous web, at least one additional gap former can be provided wherein the sheet formation of the additional layer occurs with a higher content of fines occurs at the forming element side. The additional layer is couched together with the layer created by the preceding gap former in an additional couching zone so that at least one of the two layers with a side having a higher content of fines is couched together with the other layer. The stream direction of the headbox associated with the additional gap former preferably is the same as the flow direction of the fibrous web to be formed.

A multi-layer headbox and/or a single-layer headbox and/or any combination of various headboxes can each be provided as headbox.

Uniform pressure dewatering elements can be provided for dewatering the fibrous web, if necessary. They can be embodied, for instance, like the one described in DE 197 33 316 A1.

The process according to the invention is accordingly characterized in that at least two layers to be couched together each with one side having a higher content of fines, are introduced into the relevant couching zone in such a way that their sides with a higher content of fines are in contact with one another, and in that at least one of the two layers is created by a gap former.

Advantageous embodiments of the process according to the invention are listed in the subclaims.

The invention shall be described in detail below using exemplary embodiments with reference to the drawings, which show:

Fig. 1 a schematic representation of an embodiment of a machine for producing a multi-layered fibrous web in which both layers to be couched together on their sides with a higher content of fines are each formed by gap formers,

Fig. 2 a schematic representation of another embodiment of the machine in which both sides to be couched together on their sides with a higher content of fines are formed by a gap former, in which another, first layer is formed by an endless wire former

Fig. 3 a schematic representation of another embodiment of the machine in which the first of the two layers to be couched together on their sides with a higher content of fines is formed by an endless wire former and the second layer is formed by a gap former.

Fig. 4 a schematic representation of another embodiment of the machine comparable to the one in Fig. 3 in which another gap former is provided for the formation of another layer, here third, layer, and

Fig. 5 a schematic representation of another embodiment, using that of Fig. 2 solely by way of example in which an additional gap former is provided for the formation of an additional layer, here fourth, layer.

Figs. 1 through 5 depict various embodiment of a machine for producing a multi-layered fibrous web, in particular a paper or cardboard web, in which the layers formed by each former are couched together, i.e., are connected.

The various embodiments have in common that each of the two layers to be

couched together, each having a higher content of fines on one side, are guided to the corresponding couching zone in such a way that they come into contact with each other on their sides with a higher contact of fines and that at least one of these two layers was created by a gap former.

Fig. 1 depicts a machine for producing a two-layer fibrous web in which each of the two layers A, B is created by a gap former 10 and 12.

The gap formers 10, 12 each contain two circulating endless dewatering belts 14, 16 or 14', 16', which converge, forming a headbox nip 18 or 18' and which are guided in the area of this headbox nip over a forming element, here a forming roll 20 or 20'. The outer dewatering belt 16 is guided to the forming roll 20 over a breast roll 22. Each headbox nip 18, 18' is loaded with fibrous suspension by a headbox 24 or 24'. Inside the loop of the outer dewatering belt 16, 16', a forming shoe 26 or 26' is provided immediately adjacent to the forming roll 20, 20'.

In the present case, layer A is formed by the gap former 10 and layer B by the gap former 12. The sheet formation of each of the two layers A, B occurs with a higher content of fines on the forming element side, i.e., here on the side of the forming roll 20, 20'.

As is discernible from Fig. 1, the belt travel directions L of the two gap formers 10, 12 and the stream directions of the headboxes 24, 24' associated therewith are in opposite to one another.

The layer A formed in the first gap former 10 is guided around a deflection element, here a deflection roll 28, together with the two dewatering belts 14, 16 behind the forming roll 20 in web the travel direction L and then introduced into the couching zone 30, via the outer dewatering belt 16 in a direction opposite to the general stream direction of the first headbox 24, in which the layers A, B formed by the gap formers 10,

12 are couched together at their sides with a higher content of fines. The relative distribution of fines is also depicted symbolically again in Fig. 1 at the right side.

Immediately behind the deflecting roll 28 the inner dewatering belt 14 is again separated from the outer dewatering belt 16 entraining the layer A.

Starting from the deflecting roll 28 the outer dewatering belt 16 of the first gap former 10 is guided in generally horizontal direction beyond the couching zone 30. From here, this outer dewatering belt 16 is guided back to the first gap former 10.

After the separation of the two dewatering belts 14', 16' of the second gap former 12, the layer B formed by the second gap former 12 is introduced together with the outer dewatering belt 16' into the couching zone 30, in which the two layers A, B formed in the gap formers 10, 12 are couched together with their sides of higher content of fines. In the area of the couching zone 30, the outer wire belt 16', that entrains the layer B is guided over a couching roll 32.

Fig. 2 depicts an embodiment of a machine for producing a three-layered fibrous web. Here, the first layer A is formed by an endless wire former 34 in which the sheet formation of the layer A occurs with a higher content of fines on the outer side facing away from the endless wire 36. The second layer B and the third layer C are each formed by a gap former 10 or 12.

The layer B formed in the first gap former 10 and guided over the deflection roll 28 is couched together with the first layer A formed by the endless wire former 34 in the area of this deflection roll 28. Then the two connected layers A and B are introduced by the endless wire 36 into the couching zone 30 where the two layers B, C formed by the two gap formers 10, 12 are couched together at their sides with a higher content of fines. Again, the resulting distribution of fines is depicted symbolically in Fig. 2 at the right side.

As can be seen in Fig. 2, in the present case the outer dewatering belt 16 of the first gap former 10 is separated from the inner dewatering belt 14 and the relevant layer B in front of the deflection roll 28 in the web travel direction L. Accordingly, this layer B is guided here only together with the inner dewatering belt 14 around the deflection roll 28. Then, in the area of the deflection roll 28, the first layer A formed in the endless wire former 34 and the second layer B formed in the first gap former 10 are couched together.

The layer C formed by the second gap former 12 is introduced into the couching zone 30 after a separation of the two dewatering belts 14', 16' of the second gap former together with the outer dewatering belt 16', in which zone the two layers B, C formed in the gap formers 10, 12 are then couched together at their sides with a higher content of fines.

As opposed to the embodiment according to Fig. 1, here the layer formed by the first gap former 10, i.e., here the layer B, is not introduced into the couching zone 30 by the outer belt of the first gap former 10 but rather by the endless wire 36, upon which previously another layer, i.e., the first layer A, had already been formed. The design as well as the relative position of the two gap formers 10, 12 is generally equivalent to the embodiment according to Fig. 1 in which related parts were assigned the same reference characters. The couching of the two layers B, C formed by the gap formers 10, 12 can occur in an area of a couching roll 32 wrapped by the outer dewatering belt 16' of the second gap former 12.

Fig. 3 depicts in a schematic representation another embodiment of a machine for the production of a multi-layered, here again two-layered, fibrous web. In this case the first layer A of the two layers A, B to be couched together at their sides of higher content of fines is formed by a continuous wire 38. Here, the sheet formation of this first layer A occurs with a higher content of fines on the side facing away from the continuous wire 40. The second layer B is formed by a gap former 12 whose design corresponds to that of the second gap former 12 of the embodiment according to Fig. 1. The sheet formation

of the second layer B again occurs with a higher content of fines on the forming element side, i.e., on the side of the forming roll 20'.

The stream direction of the headbox 24' associated with the gap former 12 corresponds in general to the web travel direction LA of the first layer A formed by the fourdrinier former 38.

The layer A formed by the gap former 12 is introduced into the couching zone 30 after the separation of the two dewatering belts 14', 16' of the gap former together with the outer dewatering belt 16', in which zone it is brought together with the continuous wire 40 for the couching of the two layers A, B with their sides of higher content of fines. The resulting distribution of fines is depicted symbolically in Fig. 3 at the right side.

As discernible in Fig. 3 the continuous wire 40 is guided in general horizontally from the correlating headbox 42 beyond the couching zone 30.

The embodiment depicted in Fig. 4 is different from the one in Fig. 3 in that another gap former 44 is provided for the creation of a three-layered fibrous web. In the present case, this gap former corresponds in both design and orientation to the gap former 12 that forms the second layer B. The sheet formation of the third layer C again occurs with the higher content of fines on the forming element side.

The third layer C and the second layer B formed by the preceding gap former 12 are couched together with their sides of higher content of fines in another couching zone 46.

The stream direction of the headbox 48 associated with the additional gap former 44 corresponds to the travel direction LA of the first layer A formed by the fourdrinier former 38. The third layer C formed by the additional gap former 44 is guided, after the separation of the two dewatering belts 50, 52 of the additional gap former 44, together

with the outer dewatering belt 52 to the additional couching zone 46, in which it is brought together with the continuous wire 40 in order to couch together the two layers B, C formed by the gap formers 12, 44.

The continuous wire 40 is guided beginning at the headbox 42 of the fourdrinier former 38 past the first couching zone 30 as well as past the second couching zone 46 in general horizontally and then it is guided back to the headbox 42 via deflection rolls.

Fig. 5 depicts schematically another embodiment, only by way of example based on Fig. 2, in which an additional gap former 54 is provided for the formation of another, here fourth, layer D. In the present case, this additional gap former 54 is positioned behind the two provided gap formers 10, 12 in the machine travel direction according to the embodiment of Fig. 2.

The sheet formation of the additional layer D occurs with a higher content of fines on the forming element side.

The design and orientation of the additional gap former 54 correlate in the present case to those of the preceding gap formers 12 that form the third layer C.

The fourth layer D is couched together with the third layer C formed by the preceding gap former 12 in an additional couching zone 56, in which at least one of the two layers C, D, in the present case the fourth layer D, is couched together with the other layer at a side with a higher content of fines.

The flow direction of the headbox 58 associated with the additional gap former 54 is the same as the travel direction of the fibrous web being formed, i.e., in the present case, the travel direction LA of the first layer A formed by the fourdrinier former 34.

Such an arrangement avoids the couching together of two sides with lower

content of fines in the case of an additional layer D.

The resulting distribution of fines is depicted symbolically on the right side of Fig. 5. Generally, additional gap formers are possible as well.

As discernible from Fig. 5 the continuous wire 36 is guided essentially in a horizontal direction beginning at the headbox of the fourdrinier former 34 over the first couching zone provided in the area of the deflection roll 28 of the gap former 10 as well as over the couching zone 30, in which the layers B and C are couched together with their sides having a higher content of fines, and beyond the additional couching zone 56. Then the continuous wire 36 is guided back to the headbox of the fourdrinier former 34. The present embodiment has the same design as the one of Fig. 2 in other respects as well.

The extension with at least one gap former, depicted in Fig. 5 for instance, is also possible in the preceding embodiments.

In all cases the headboxes can be provided as multi-layered headboxes or as single-layered headboxes.

If necessary, uniform pressure dewatering elements can be used for dewatering the fibrous web. They can be designed, for instance, such as the ones described in DE 197 33 316 A1.

List of Reference Characters

10	Gap former
12	Gap former
14	Inner dewatering belt
14'	Inner dewatering belt
16	Outer dewatering belt
16'	Outer dewatering belt
18	Headbox nip
18'	Headbox nip
20	Forming roll
20'	Forming roll
22	Breast roll
22'	Breast roll
24	Headbox
24'	Headbox
26	Forming shoe
26'	Forming shoe
28	Deflection roll
30	Couching zone
32	Couching roll
34	Fourdrinier former
36	Continuous wire
38	Fourdrinier former
40	Continuous wire
42	Headbox
44	Additional gap former
46	Couching zone
48	Headbox
50	Inner dewatering belt

52	Outer dewatering belt
54	Additional gap former
56	Additional couching zone
58	Headbox

A	Layer
B	Layer
C	Layer
D	Layer
L	Web travel direction
LA	Travel direction of the first layer

Claims

1. Machine for the production of a multi-layered fibrous web, in particular a paper web or a cardboard web, in which the layers (A, B; B, C) formed by a corresponding former (10, 12, 34, 38) are couched together, characterized in that at least two layers (A, B; B, C) to be couched together, each having on one side a higher content of fines are introduced into the couching zone (30) in such a way that they come into contact with each other with their sides of higher contact of fines, and in that at least one of these two layers (A, B; B, C) was created by a gap former (10, 12).

2. Machine according to claim 1, characterized in that at least one of the two layers (A, B; B, C) is created by a gap former (10, 12) which comprises two circulating continuous dewatering belts (14, 16) which converge, in forming a headbox nip (18), and which are guided in the area of this headbox nip (18) that is supplied with a fibrous suspension by a headbox (24) over a forming element (20), such as in particular a forming roll.

3. Machine according to claim 2, characterized in that each of the two layers (A, B; B, C) is created by a separate gap former (10, 12) and the sheet formation of each of the two layers (A, B; B, C) occurs with higher content of fines on the forming element side.

4. Machine according to claim 3, characterized in that the web travel directions (L) of the two gap formers (10, 12) are opposite each other.

5. Machine according to claim 4, characterized in that the layer (A; B) created in the first of the two gap formers (10, 12) is guided together with at least one of the two dewatering belts (14, 16) around a deflection element (28), preferably a deflection roll, and then introduced via a continuous belt (16, 36), traveling in the generally

opposite direction to the stream direction of the first headbox (24), into the appropriate couching zone 30 in which the layers (A, B; B, C) created by the two gap formers (10, 12) are couched together with their sides of higher content of fines.

6. Machine according to claim 5, characterized in that the layer (A) created in the first gap former (10) is guided around the deflection element (28) together with the outer dewatering belt (16), which does not come into contact with the forming element (20), and which is introduced into the couching zone (30) via this outer dewatering belt (16).

7. Machine according to claim 6, characterized in that the two dewatering belts (14, 16) are guided around the deflection element (28), and the inner dewatering belt (14) is separated from the outer dewatering belt (16) which entrains the layer (A) following this deflection element.

8. Machine according to claim 6 or 7, characterized in that the outer dewatering belt (16) of the first gap former (10) consecutive to the deflection element (28) is guided preferably in general in a horizontal direction, at least up to the area of the couching zone (30).

9. Machine according to claim 5, characterized in that another layer (A) is created by a fourdrinier former (34) and the sheet formation of this layer (A) occurs with the higher content of fines on the outer side facing away from the continuous wire (36), in that the layer (B) created in the first gap former (20) and guided over the deflection element (28) is couched together with the layer (A) created by the fourdrinier former (34) and in that these two layers (A, B) are introduced via the continuous wire (36) into the couching zone (30) in which the layers (B, C) created by the two gap formers (10, 12) are couched together with their sides of higher content of fines.

10. Machine according to claim 9, characterized in that the outer dewatering belt (16) of the first gap former (10) is separated in web travel direction (L) in front of the deflection element (28) from the inner dewatering belt (14) and the relevant layer (B), and the layer (B) is guided around the deflection element (28) only together with the inner dewatering belt (14).

11. Machine according to claim 9 or 10, characterized in that the layer (A) formed in the fourdrinier former (34) and the layer (B) formed in the first gap former (10) are couched together in the area of the deflection element (28) and/or in a couching roll.

12. Machine according to one of the preceding claims, characterized in that, after the separation of the two dewatering belts (14', 16') of the second gap former (12), the layer (B; C) created by the second gap former is introduced together with the outer dewatering belt (16') into the couching zone (30) in which the two layers (A, B; B, C) created in the gap formers (10, 12) are couched together with their sides of higher content of fines.

13. Machine according to claim 1 or 2, characterized in that the first (A) of the two layers (A, B) to be couched together with their sides of higher content of fines is created by a fourdrinier former (38) and the sheet formation of this first layer (A) occurs with the higher content of fines on the outer side facing away from the continuous wire (40), and in that the second layer (B) is created by a gap former (12) and the sheet formation occurs in this second layer (B) with a higher content of fines on the forming element side.

14. Machine according to claim 13, characterized in that the stream direction of the headbox (24') associated with the gap former (12) correlates in general with the travel direction (LA) of the first layer (A) created by the fourdrinier former.

15. Machine according to claim 13 or 14, characterized in that the layer (B) created by the gap former (12) is introduced, after the separation of the two dewatering belts (14', 16') of the gap former (12), together with the outer dewatering belt (16') into the couching zone (30) in which it is joined with the continuous wire (40) for the two layers (A, B) to be couched together.

16. Machine according to one of the claims 13 through 15, characterized in that the continuous wire (40) is guided at least in the area of the couching zone (30) preferably in a generally horizontal direction.

17. Machine according to one of the claims 13 through 16, characterized in that at least one additional gap former (44) is provided and the sheet formation of the correlating additional layer (C) occurs with a higher content of fines on the forming element side and in that the additional layer (C) is couched together with the layer (B) created by the first gap former (12) in an additional couching zone (46).

18. Machine according to claim 17, characterized in that the stream direction of the headbox (48) associated with the additional gap former (44) corresponds to the travel direction (LA) of the layer created by the fourdrinier former (38).

19. Machine according to claim 17 or 18, characterized in that the additional layer (C) created by the additional gap former (44) is introduced after the separation of the two dewatering belts (50, 52) of the additional gap former (44) together with the outer dewatering belt (52) into the additional couching zone (46), in which it is brought together with the continuous wire (40) for couching together the two layers (B, C) created by gap formers (12, 44).

20. Machine according to claim 19, characterized in that the continuous wire (40) is guided at least in the area of the two couching zones (30, 46) preferably in a

generally horizontal direction.

21. Machine according to one of the preceding claims, characterized in that for the formation of an at least three-layered or four-layered fibrous web at least one additional gap former (54) is provided and the sheet formation of the additional layer (D) occurs with higher content of fines on the forming element side, and that the additional layer (D) is couched together with the layer (C) created in the preceding gap former in an additional couching zone (56), in which at least one of the two layers (C, D) is couched together with the other layer on a side of higher content of fines.

22. Machine according to claim 21, characterized in that the stream direction of the headbox (58) associated with the additional gap former (54) corresponds to the travel direction of the fibrous web to be created.

23. Machine according to one of the preceding claims, characterized in that at least one multi-layered headbox and/or at least one single layered headbox and/or a combination of different headboxes is provided.

24. Machine according to one of the preceding claims, characterized in that at least one single layered headbox is provided.

25. Machine according to one of the preceding claims characterized in that uniform pressure dewatering elements are provided for web dewatering.

26. Process for the production of a multi-layered fibrous web, in particular a paper web or a cardboard web, in which the layers (A, B; B, C) each created by a former (10, 12, 34, 38) are couched together, characterized in that at least two layers (A, B; B, C) to be couched together, each having on one side a higher content of fines, are introduced into the couching zone (30) in such a way that

they come into contact with each other on their sides with higher content of fines and that at least one of these two layers (A, B; B, C) is created by a gap former (10, 12).

27. Process according to claim 26, characterized in that at least one of the two layers (A, B; B, C) is created by a gap former (10, 12) which contains two circulating continuous dewatering belts (14, 16) that run together forming a headbox nip (18) and which are guided in the area of this headbox nip (18), loaded with a fibrous suspension by a headbox, over a forming element (20), such as in particular a forming roll.

28. Process according to claim 27, characterized in that each of the two layers (A, B; B, C) is formed by a separate gap former (10, 12) and the sheet formation of the two layers (A, B; B, C) occurs in each case with the higher content of fines on the forming element side.

29. Process according to claim 28, characterized in that the two gap formers (10, 12) are operated in opposite web travel directions (L).

30. Process according to claim 29, characterized in that the layer (A; B) formed in the first of the two gap formers (10, 12) is guided together with at least one of the two dewatering belts (14, 16) around a deflection element (28), preferably a deflection roll, and then via a continuous belt (16; 36) introduced in a direction generally opposite to the travel direction of the first headbox (24) into the correlating couching zone (30) in which the layers (A, B; B, C) created by the two gap formers (10, 12) are couched together with their sides of higher content of fines.

31. Process according to claim 30, characterized in that the layer (A) created in the first gap former is guided together with the outer dewatering belt (16), which does not come into contact with the forming element (28), around the deflection

element (28) and introduced into the couching zone (30) via this outer dewatering belt (16).

32. Process according to claim 31, characterized in that the two dewatering belts (14, 16) are guided around the deflection element (28) and the inner dewatering belt (14) is separated from the outer dewatering belt (16) entraining the layer (A) consecutive to this deflection element.

33. Process according to claim 30, characterized in that an additional layer (A) is created by a fourdrinier former (34) and the sheet formation of this layer (A) occurs with the higher content of fines on the facing away from the continuous wire (36), in that the layer (B), created in the first gap former (10) and guided over the deflection element (28), is couched together with the layer (A), formed by the fourdrinier former (34), and in that these two layers (A, B) are introduced via the continuous wire (36) into the couching zone (30) in which the layers (B, C) formed by the two gap formers (10, 12) are couched together with their sides of higher content of fines.

34. Process according to claim 33, characterized in that the outer dewatering belt (16) of the first gap former (10) is separated in web travel direction in front of the deflection element (28) from the inner dewatering belt (14) and the relevant layer (B), and the layer (B) is guided around the deflection element (28) only together with the inner dewatering belt (14).

35. Process according to claim 33 or 34, characterized in that the layer (A) formed in the fourdrinier former (34) and the layer (B) created in the first gap former (10) are couched together in the area of the deflection element (28) and/or a couching roll.

36. Process according to one of the preceding claims, characterized in that the layer

(B; C) created by the second gap former (10) is guided after the separation of the two dewatering belts (14', 16') of the second gap former (10) together with the outer dewatering belt (16') to the couching zone (30), in which the two layers (A, B; B, C) created in the gap formers (10, 12) are couched together with their sides of higher content of fines.

37. Process according to claim 26 or 27, characterized in that the first (A) of the two layers (A, B) to be couched together with their sides of higher content of fines is created by a fourdrinier former (38) and the sheet formation of this first layer (A) occurs with a higher content of fines on the outside facing away from the continuous wire (40), and that the second layer (B) is created by a gap former (12) and that the sheet formation in this second layer (B) occurs with the higher content of fines on the forming element side.

38. Process according to claim 37, characterized in that the stream direction of the headbox (24')associated with the gap former (12) is selected in general correlating to the travel direction (LA) of the first layer (A) created by the fourdrinier former.

39. Process according to claim 37 or 38, characterized in that the layer (A) created by the gap former (A) is guided to the couching zone (30) after the separation of the two dewatering belts (14', 16') of the gap former (12) together with the outer dewatering belt (16'), in which it is brought together with the continuous wire (40) for the couching of the two layers (A, B).

40. Process according to one of claims 37 through 39, characterized in that at least one additional gap former (44) is used and the sheet formation of the relevant additional layer (C) occurs with a higher content of fines on the forming element side, and that the additional layer (C) is couched in another couching zone (46) together with the layer (B) created by the first gap former (12).

41. Process according to claim 40, characterized in that the stream direction of the headbox (48) associated with the additional gap former (44) is chosen correlating to the travel direction (LA) of the layer formed by the fourdrinier former (38).

42. Process according to claim 40 or 41, characterized in that the additional layer (C) created by the additional gap former (44) is introduced, after the separation of the two dewatering belts (50, 52) of the additional gap former (44), together with the outer dewatering belt (52) into the additional couching zone (46) in which it is brought together with the continuous wire (40) for the couching of the two layers (B, C) formed by the gap formers (12, 44).

43. Process according to one of the preceding claims, characterized in that at least one additional gap former (54) is used for the formation of an at least three-layered or four-layered fibrous web and the sheet formation of the additional layer (D) occurs with a higher content of fines on the forming element side, and that the additional layer (D) is couched in an additional couching zone (56) with a layer (C) created by a preceding gap former, and where at least one of the two layers (C, D) is couched together with the other layer with a side of higher content of fines.

44. Process according to claim 43, characterized in that the stream direction of the headbox (58) associated with the additional gap former (54) is chosen correlating to the travel direction of the fibrous web to be created.

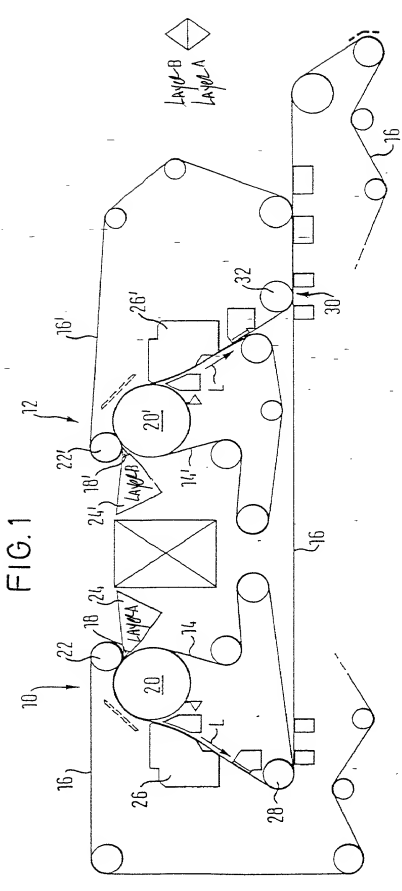
45. Process according to one of the preceding claims, characterized in that at least one multi-layered headbox and/or at least one single-layered headbox and/or a combination of different headboxes is used.

Abstract

In a machine for the production of a multi-layered fibrous web, in particular a paper web or a cardboard web, in which the layers A, B each formed by a former 10, 12 are couched together, at least two sides A, B to be couched together, have on one side a higher content on fines, and are introduced into the couching zone 30 in such a way, that they come into contact with their sides of higher content of fines. Here, at least one of these two layers A, B is created by a gap former 10, 12.

Fig. 1.

FIG. 1



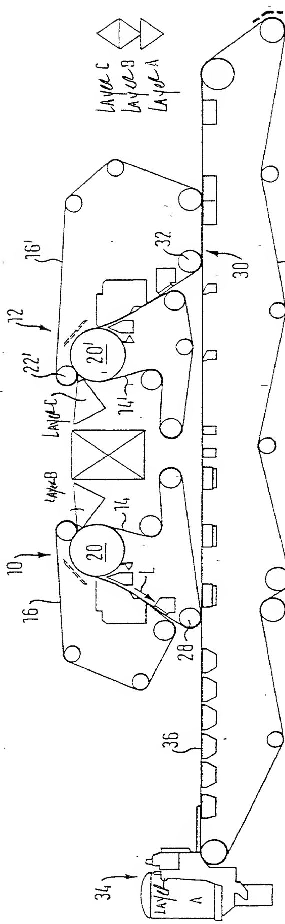

LAYER C
LAYER B
LAYER A
16'
12
32
30
36
22'
20'
LAYER C
14'
LAYER B
14
10
20
L
16
28
36
34
LAYER A

FIG. 2

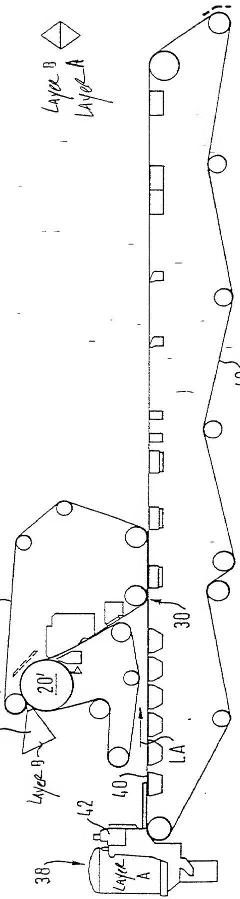


FIG. 3

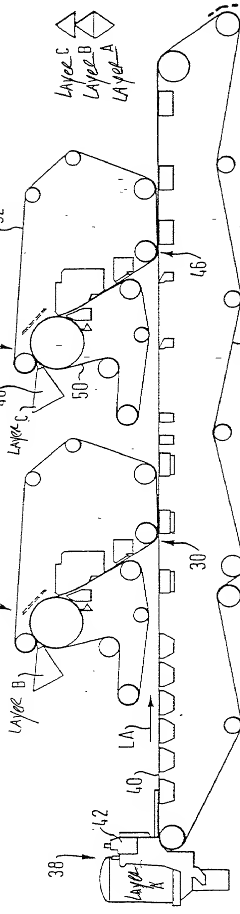
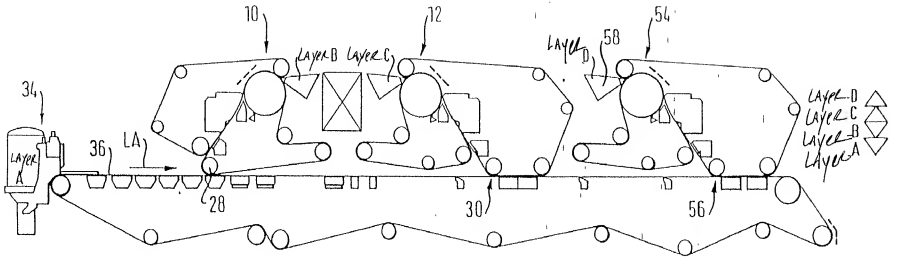

Layer C
Layer B
Layer A
52
44
48
Layer C
50
46
40
12
30
Layer B
LA
40
42
38
Layer A

FIG. 4

FIG. 5



Declaration and Power of Attorney For Utility or Design Patent Application

Erklärung für Patentanmeldungen zur Gebrauchseignung und Entwicklung mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

daß mein Wohnsitz, meine Postanschrift und meine Staatsangehörigkeit den im nachstehenden nach meinem Namen aufgeführten Angaben entsprechen, daß ich nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent für die Erfindung mit folgendem Titel beantragt wird:

MASCHINE UND VERFAHREN ZUR HERSTELLUNG EINER MEHRLAGIGEN FASERSTOFFBAHN

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

MACHINE AND PROCESS FOR PRODUCING A MULTI-LAYER FIBROUS MATERIAL WEB

deren Beschreibung hier beigefügt ist, es sei denn (in diesem Falle Zutreffendes bitte ankreuzen), diese Erfindung

☒ wurde angemeldet am 21 January 2000
unter der US-Anmeldenummer ______
und wurde am ______ abgeändert (falls zutreffend) oder

unter der PCT internationalen Anmeldungsnummer PCT/EP00/00491
und wurde am ______ abgeändert (falls zutreffend).

the specification of which is attached hereto unless the following box is checked:

☒ was filed on 21 January 2000 as
United States Application Number ______
and was amended on ______ (if applicable) or,

PCT International Application Number PCT/EP00/00491
and was amended on ______ (if applicable).

Ich bestätige hiermit, daß ich den Inhalt der oben angegebene Patentanmeldung, einschließlich der Ansprüche, die eventuell durch einen oben erwähnten Zusatzantrag abgeändert wurde, durchgesehen und verstanden habe.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, § 1.56 von Belang sind.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Title 35, US-Code, § 119 (a)-(d), bzw. § 365(b) aller unten aufgeführten Auslandsanmeldungen für Patente oder Erfinderurkunden, oder § 365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslandsanmeldungen für Patente bzw. Erfinderurkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

I hereby claim foreign priority under Title 35, United States Code §119 (a-d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States, listed below. I have also identified below, by checking the "No" box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Applications
Frühere ausländische Anmeldungen

(Number) (Nummer)	(Country) (Land)	(Day/Month/Year Filed) (Tag/Monat/Jahr der Anmeldung)	Priority Claimed Prioritätsanspruch	
199 03 943.7	Germany	28/01/1999	☒ Yes Ja	☐ No Nein
			☐ Yes Ja	☐ No Nein

☐ Zusätzliche einstweilige Anmeldungsnummern sind im Prioritätsanhang aufgeführt.

☐ Additional foreign application numbers are listed on a supplemental priority sheet attached hereto.

German Language Utility or Design Patent Application Declaration

Ich beanspruche hiermit Prioritätsvorteile unter Title 35, US-Code. § 119(e) aller US-Hilfsanmeldungen wie unten aufgezählt.

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

(Application Number) (Aktenzeichen)	(Day/Month/Year Filed) (Tag/Monat/Jahr der Anmeldung)
(Application Number) (Aktenzeichen)	(Day/Month/Year Filed) (Tag/Monat/Jahr der Anmeldung)
(Application Number) (Aktenzeichen)	(Day/Month/Year Filed) (Tag/Monat/Jahr der Anmeldung)

☐ Zusätzliche einstweilige Anmeldungsnummern sind im ergänzenden Prioritätsanhang aufgeführt.

☐ Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

Ich beanspruche hiermit die mir unter Title 35, US-Code, § 120 zustehenden Vorteile aller unten aufgeführten US-Patentanmeldungen bzw. § 365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung nicht in einer US-Patentanmeldung, bzw. PCT internationalen Anmeldung in in einer gemäß dem ersten Absatz von Title 35, US-Code, § 112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind und die im Zeitraum zwischen dem Anmeldetag der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesen (PCT) gültigen internationalen Anmeldetags bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

(Application No.) (Aktenzeichen)	(Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	(Status) (patentiert, schwebend, aufgegeben) (patented, pending, abandoned)
(Application No.) (Aktenzeichen)	(Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	(Status) (patentiert, schwebend, aufgegeben) (patented, pending, abandoned)

☐ Zusätzliche USA oder internationale Anmeldungsnummern sind im ergänzenden Prioritätsanhang aufgeführt.

☐ Additional U.S. or international application numbers are listed on a supplemental priority sheet attached hereto.

Ich erkläre heirmit, daß alle in der vorliegenden Erklärung von mir gemachte Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissentlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Hiermit bevollmächtgt der Unterzeichnete den hierin genannten entweder USA-Anwalt oder Stellvertreter, in der Abwesenheit einer direkten Verständigung zwischen den USA-Anwalt oder Stellvertreter und dem Unterzeichneten Anweisungen, die der der Anmeldung betreffend dem Patent und Warenzeichen Amt zugestellt werden, von entweder seinem ausländischen Patentvertreter oder Stellvertreter der Gesellschaft anzunehmen und auszuführen. Sollte sich das Personal ändern, von dem Anweisungen angenommen werden mögen, dann wird der hierin genannte USA-Anwalt oder Stellvertreter entprechend von dem Unterzeichneten benachrichtigt.

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from either his foreign patent agent or corporate representative, if any, as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

German Language Utility or Design Patent Application Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent- und Markenamt: *(Name(n) und Registrationsnummer(n) auffisten)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: *(list name and registration number)*

KUNDENNUMMER 7055

CUSTOMER NUMBER 7055

Die ernannten Patenanwälte sind zur Zeit:

The appointed attorneys presently include:

Neil F. Greenblum	Reg. No. 28,394
Bruce H. Bernstein	Reg. No. 29,027
James L. Rowland	Reg. No. 32,674
Arnold Turk	Reg. No. 33,094
Stephen M. Roylance	Reg. No. 31,296

Address: **Greenblum & Bernstein, P.L.C.**
1941 Roland Clarke Place
Reston, VA 20191

Telefongespräche bitte richten an:

Direct Telephone Calls to:

Greenblum & Bernstein, P.L.C.
(703) 716-1191

Vor-und Nachname des einzigen oder ersten Erfinders: **Dr. Günter HALMSCHLAGER**	Full name of sole or first inventor **Dr. Günter HALMSCHLAGER**
Unterschrift des Erfinders Datum K 2000-07-20	Inventor's signature Date K 2000-07-20
Wohnsitz **Krems, Österreich**	Residence **Krems, Austria**
Staatsangehörigkeit **Österreich**	Citizenship **Austria**
Postanschrift **Weinzierlbergstrasse, 3500 Krems, Österreich**	Post Office Address **Weinzierlbergstrasse, 3500 Krems, Austria**
Vor-und Nachname des zweiten Miterfinders (falls zutreffend) **Franz STELZHAMMER**	Full name of second joint inventor, if any **Franz STELZHAMMER**
Unterschrift des zweiten Erfinders Datum K 26.7.2000	Second Inventor's Signature Date K 26.7.2000
Wohnsitz **Böheimkirchen, Österreich**	Residence **Böheimkirchen, Austria**
Staatsangehörigkeit **Österreich**	Citizenship **Austria**
Postanschrift **Grub 11, 3071, Böheimkirchen, Österreich**	Post Office Address **Grub 11, 3071, Böheimkirchen, Austria**
(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).	(Supply similar information and signature for third and subsequent joint inventors).

German Language Utility or Design Patent Application Declaration

Vor- und Nachname des dritten Miterfinders: Erich BRUNNAUER	Full name of third inventor, if any Erich BRUNNAUER
Unterschrift des dritten Erfinders Datum X 2000-07-20	Third Inventor's signature Date X 2000-07-20
Wohnsitz Krems/Rehberg, Österreich	Residence Krems/Rehberg, Austria
Staatsangehörigkeit Österreich	Citizenship Austria
Postanschrift Seilerweg 4, 3500 Krems/Rehberg, Österreich	Post Office Address Seilerweg 4, 3500 Krems/Rehberg, Austria
Vor- und Nachname des vierten Miterfinders (falls zutreffend) Manfred GLOSER	Full name of fourth inventor, if any Manfred GLOSER
Unterschrift des vierten Erfinders Datum X 2000-07-20	Fourth Inventor's Signature Date X 2000-07-20
Wohnsitz St. Pölten, Österreich	Residence St. Pölten, Austria
Staatsangehörigkeit Österreich	Citizenship Austria
Postanschrift Damaschkestrasse 14, 3100 St. Pölten, Österreich	Post Office Address Damaschkestrasse 14, 3100, St. Pölten, Austria
Vor- und Nachname des fünften Miterfinders (falls zutreffend) Dr. Manfred REICHTINGER	Full name of fifth inventor, if any Dr. Manfred REICHTINGER
Unterschrift des fünften Erfinders Datum X 20.7.00	Fifth Inventor's Signature Date X 20.7.00
Wohnsitz St. Pölten, Österreich	Residence St. Pölten, Austria
Staatsangehörigkeit Österreich	Citizenship Austria
Postanschrift Heidenheimerstrasse 18, 3100 St. Pölten, Österreich	Post Office Address Heidenheimerstrasse 18, 3100 St. Pölten, Austria
Vor- und Nachname des sechsten Miterfinders (falls zutreffend) Thomas NAGLER	Full name of sixth inventor, if any Thomas NAGLER
Unterschrift des sechsten Erfinders Datum X 2000-07-20	Sixth Inventor's signature Date X 2000-07-20
Wohnsitz St. Pölten, Österreich	Residence St. Pölten, Austria
Staatsangehörigkeit Deutschland	Citizenship Germany
Postanschrift Heidenheimerstrasse 44, 3100 St. Pölten, Österreich	Post Office Address Heidenheimerstrasse 44, 3100 St. Pölten, Austria
(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).	(Supply similar information and signature for seventh and subsequent joint inventors).

German Language Utility or Design Patent Application Declaration

Vor-und Nachname des siebten Miterfinders: Johannes STIMPFL	Full name of seventh inventor, if any Johannes STIMPFL
Unterschrift des siebten Erfinders Datum X Johannes Stimpfl X 26.7.2000	Seventh Inventor's signature Date X Johannes Stimpfl X 26.7.2000
Wohnsitz Wimpassing, Österreich	Residence Wimpassing, Austria
Staatsangehörigkeit Österreich	Citizenship Austria
Postanschrift Kappellenweg 1, 3385 Wimpassing, Österreich	Post Office Address Kappellenweg 1, 3385 Wimpassing, Austria
Vor-und Nachname des achten Miterfinders (falls zutreffend) Josef BACHLER	Full name of eighth inventor, if any Josef BACHLER
Unterschrift des achten Erfinders Datum X D.I. Josef Bachler X 29-09-2000	Eighth Inventor's Signature Date X D.I. Josef Bachler X 29-09-2000
Wohnsitz Ulmerfeld-Hausmening, Österreich	Residence Ulmerfeld-Hausmening, Austria
Staatsangehörigkeit Österreich	Citizenship Austria
Postanschrift Josefsberg 12, 3363 Ulmerfeld-Hausmening, Österreich	Post Office Address Josefsberg 12, 3363 Ulmerfeld-Hausmening, Austria
Vor-und Nachname des neunten Miterfinders (falls zutreffend) Christoph MERCKENS	Full name of ninth inventor, if any Christoph MERCKENS
Unterschrift des neunten Erfinders Datum X Ch. Merckens X 27.7.2000	Ninth Inventor's Signature Date X Christoph Merckens X 27.7.2000
Wohnsitz Schwertberg, Österreich	Residence Schwertberg, Austria
Staatsangehörigkeit Österreich	Citizenship Austria
Postanschrift Josefstal 10, 4311 Schwertberg, Österreich	Post Office Address Josefstal 10, 4311 Schwertberg, Austria
Vor-und Nachname des zehnten Miterfinders (falls zutreffend)	Full name of tenth inventor, if any
Unterschrift des zehnten Erfinders Datum	Tenth Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address
(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).	(Supply similar information and signature for eleventh and subsequent joint inventors).